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Focus in Italian echo wh-questions: An analysis at syntax-prosody interface

https://doi.org/10.1515/probus-2017-0011

Abstract: In this article, we propose an analysis of the so-called echo wh-questions *in situ* in Italian at syntax–prosody interface. We conduct a prosodic analysis under an experimental approach, showing that a focalized wh-word in echo wh-questions shows its own peculiar properties, different from informative and corrective focus, so that we can analyze it as an instance of Mirative focus. We demonstrate that the wh-word in echo wh-questions occupies a focus position in the low periphery of the clause. We also argue that this position has syntactic properties that, interlaced together with the prosodic properties, lead us to define the projection as a dedicated focus projection for Mirative focus. Crucially, the focus position within the low periphery activated in an echo wh-question, has different syntactic, prosodic and interpretive properties with respect to the informational focus, and to the corrective focus. Therefore, at a general level, our analysis strengthens the idea that partly different intonations and interpretations are associated to positions within the low periphery as opposed to the positions in the left periphery.

Keywords: Italian echo wh-questions, focus, syntax-prosody interface, low periphery

1 Introduction

In this work, we explore the interplay of prosody and syntax in echo wh-questions *in situ*, as in (1):

(1) *Hai* *visto* *COSA?*[1]
Have.PRS.2SG see.PST.PRT what
'Did you see what?'

1 Capital letters indicate that the word is uttered with a special emphasis.

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Echo wh-questions such as the one exemplified in (1) are usually defined as echo wh-questions *in situ*, due to the fact that the wh-word does not undergo overt wh-movement to the left periphery as it happens in Italian regular information-seeking wh-questions, like in (2):

(2) *Cosa hai visto?*
what have.PRS.2SG see.PST.PRT
'What did you see?'

With this article, our goal is to show that the wh-word in echo wh-questions such as (1) is not *in situ*, but it undergoes a syntactic movement. We also show that, on the basis of their structural and interpretive properties, echo wh-questions realize a type of Mirative focus (henceforth: MirF) and are therefore different from other *prima facie* similar constructions.

Our proposal is grounded on the hypothesis that the relationship between prosodic properties and semantic–pragmatic interpretation is mediated by syntactic structure and that prosodic representation is built through mapping rules accessing syntax at spell out (see Downing 1970; Bartels 1999; Watson and Gibson 2004; Csirmaz 2005; Selkirk 1984, 2011 and related work, Truckenbrodt 2007, 2012, 2013; as for Italian see Frascarelli 2000, 2008; Bocci 2013). In this framework, experimental examination of prosodic realization can cast light on the structural properties of sentences.

The paper is structured as follows: in Section 1, we present the research questions. In Sections 2 and 3, we describe the interpretation properties and propose a syntactic analysis of MirF in Italian echo wh-questions. In Section 4, we illustrate the syntax–prosody framework we adopt, while in the subsection that follows we present two prosodic experiments. In Section 5, we discuss the results of the experiments and draw the conclusions of this study.

1.1 Research questions

As mentioned in the previous section, echo wh-questions such as the one exemplified in (1) are usually defined as echo wh-questions *in situ*. In fact, in a SVO language such as Italian, the wh-direct object appears on the right of the verb, in a position which corresponds *prima facie* to the canonical argument (object) position. However, in echo questions, the wh-word can also be another type of argument, such as a subject (ex. [3a]), or an adjunct (in the sense of Rizzi 1993) (ex. [3b]). Also in these cases the wh-word can always appear in postverbal position:

(3) a. *Ha* *parlato* *CHI?*
Have.PRS.3SG speak.PST.PRT who
'Who has spoken?'
b. *Hai* *parlato* *QUANDO?*
Have.PRS.2SG speak.PST.PRT when
'When did you speak?'

Interestingly, there is a clear interaction between prosody and syntax in this kind of sentences. In fact, sentences such as (1) and (3) are ungrammatical if uttered without any special prosodic emphasis on the wh-, as shown in (4):

(4) a. * *Hai* *visto* *cosa?*
Have.PRS.2SG see.PST.PRT what
Lit. 'You have seen what?'
b. * *Ha* *parlato* *chi?*
Have.PRS.3SG speak.PST.PRT who
Lit. 'Has spoken who?'
c. * *Hai* *parlato* *quando?*
Have.PRS.2SG speak.PST.PRT when
Lit. 'You have spoken when?'

In this respect, echo questions differ from declarative sentences. In declaratives, it is possible to focalize any element within the sentence by emphasizing it *in situ* with a special prosody. However, the presence vs. absence of prosodic emphasis does not affect the grammaticality of the clause,[2] as shown in (5)[3]:

(5) a. *Ho* *studiato* *linguistica*
have.PRS.1 study.PST.PRT linguistics
'I studied linguistics'
b. *Ho* *studiato* *LINGUISTICA*
have.PRS.1S study.PST.PRT linguistics
'I studied LINGUISTICS (not chemistry)'

2 However, notice that the prosodic emphasis affects the information structure of the clause.
3 Notice that in Italian it is possible to focalize even a single morpheme within a word, as illustrated by the following example:

(i) Io ho SOTTOscritto, non soprascritto
I have.PRS.1SG subscribe.PST.PRT not superscribe.PST.PRT
'I have SUBscribed, not superscribed'

c. *HO* *studiato* *linguistica*
have.PRS.1S study.PST.PRT linguistics
'I did study linguistics'

It should be noticed that, from a prosodic point of view, the general pattern of an echo wh-question remains the same, independently from the thematic role that the wh- plays in the clause. This is shown by the examples presented in Figures 1–3, produced by a female speaker of the Italian variety spoken in Este, province of Padua (Veneto region, Northeast Italy). These utterances have a

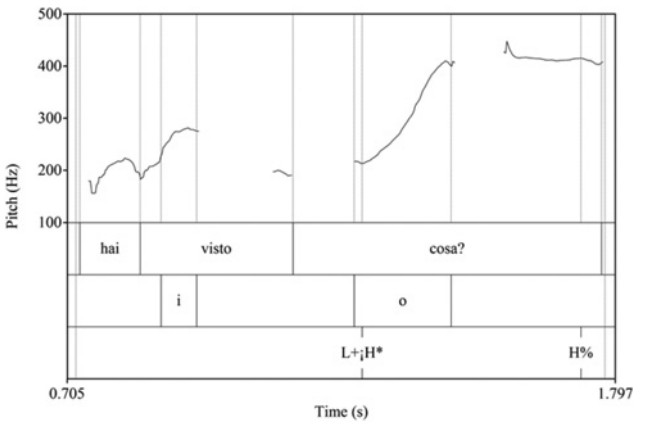


Figure 1: Utterance *Hai visto COSA?* produced by a female speaker from Este.

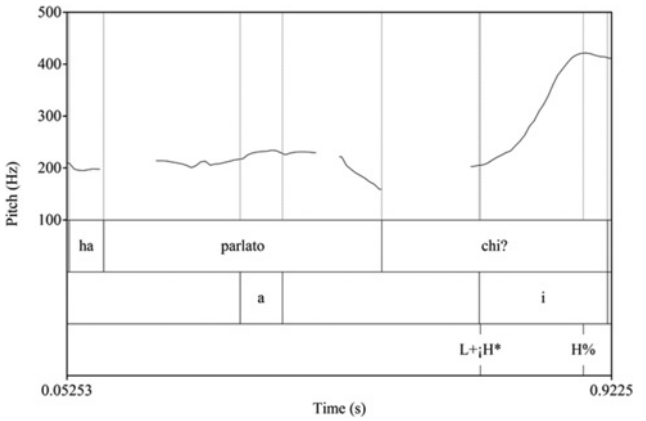


Figure 2: Utterance *Ha parlato CHI?* produced by a female speaker from Este.

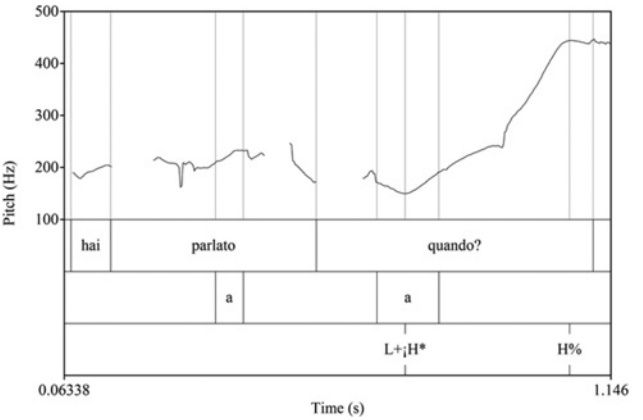


Figure 3: Utterance *Hai parlato QUANDO?* produced by a female speaker from Este.

similar prosodic pattern, characterized by a rising accent on the last lexical item, followed by a steep pitch rise ending with a plateau.[4]

In this paper, we analyze echo wh-questions, in which the wh- is a locative adjunct. By examining a locative wh- rather than an argument wh-, we intend to separate the properties of the echo wh- from those linked to the argument role.

We tackle the following problems: (i) which type of focus is expressed by the wh-word in echo questions and (ii) which structural position of this focus is.

2 Mirative focus in echo questions

An echo wh-question is necessarily d-linked to a previous discourse uttered by an interlocutor. With an echo question, the speaker asks for a repetition of a piece of information in two possible contexts: we will call them *noise context* and *surprise context* (Badan et al. 2017). In the noise context, Speaker B did not hear what Speaker A said and asks for repetition (see ex. [6]); in the surprise context Speaker B heard what the interlocutor said and utters an evaluative statement expressing surprise (see ex. [7])[5]:

4 For the prosodic analysis see Section 4.1.4.

5 Example from Badan et al. (2017).

(6) **Noise context**. Interlocutor A and B are having a conversation in a noisy restaurant and they are talking about interlocutor A's baby, Mary, who has just started with eating solid food. Interlocutor B does not hear due to the noise what Mary ate yesterday.

Speaker A:	*Ieri*	*Maria*	*ha*	*mangiato #NOISE#.*
	yesterday	Maria	have.PRS.3SG	eat-PST.PRT
	'Maria ate ...'			
Speaker B:	*Ha*	*mangiato*	*COSA?*	
	have.PRS.3SG	eat-PST.PRT	what?	
	Non	*ho*	*sentito.*	
	not	have.PRS.1SG	hear-PST.PRT	
	'She ate WHAT? I did not hear you.'			

(7) **Surprise context**. Interlocutor A and B are talking about what they did yesterday.

Speaker A:	*Ieri*	*ho*	*mangiato*	*cavallette.*		
	Yesterday	have.PRS.1SG	eat-PST.PRT	grasshopper-pl		
	'Yesterday, I ate grasshoppers.'					
Speaker B:	*Hai*	*mangiato*	*COSA?*	*Non*	*posso*	*crederci!*
	have.PRS.3SG	eat-PST.PRT	what	not	can-PRS.1SG	believe-it
	'You ate WHAT? I cannot believe it!					

In an echo question, therefore, the wh-word is a focus with respect to the rest of the sentence, which is the repetition of a (freshly uttered) known/given information. The wh-word also bears a prosodic prominence that highlights and puts in contrast what Speaker B already knows with respect to what she needs to be repeated.

It should be noticed that the two contexts differ at least in one respect: in the surprise context, the question expresses a counter-expectational value, since the piece of information provided by the interlocutor is unexpected. In noise context, the counter-expectational value is not present. Based on this observation, we can consider the surprise context as triggering MirF. On the lines of a number of studies on MirF (a.o. De Lancey 1997, 2001; Brunetti 2009; Paoli 2009; Cruschina 2012; Cruschina et al. 2015; Bianchi et al. 2015; Jiménez-Fernández 2015; Rizzi and Belletti 2017), we consider MirF as a focalization in which unexpectedness and surprise with respect to some event are involved. In terms of Jiménez-Fernández (2015: 52) "...in Mirative focus the speaker shows the unexpectedness of its content for himself/herself." In what follows, we will focus exclusively on the analysis of echo wh-questions occurring in surprise context.

3 The syntax of MirF in echo wh-questions

3.1 Left and low periphery

In this section, we show that the wh-word in an echo wh-question actually is not *in situ*, but occupies a different syntactic position, in a one-to-one relation with its interpretative and prosodic features.

Studies on the Cartography of the left periphery of the clause started with Rizzi (1997) have shown that the clause external area is a rich and articulated space. Several dedicated positions split the single head complementizer, so that between Force and Finiteness various other functional internal positions are identified:

(8) [Topic*][6] [Focus] [Topic*][7] [IP]

Processes of focalization and topicalization are thus analyzed as involving movement of a phrase to the dedicated positions in the left periphery. In this view, the different interpretations of the peripheral constituent either as a topic or as a focus with respect to the following sentence, is an automatic reflex of the derived configuration. For the Cartographic approach, the relation between syntax and the interpretive interface is expressed in an optimally simple way: the interpretation is read off the syntactic configuration. The same analysis should also lead to an equally simple way to express the relation of the syntactic configuration with the prosodic interface. In this framework, prosodic representation is built on default mapping rules, which determine main prominent placement and phrasing in unmarked conditions. The presence of a focus feature, however, causes the activation of feature-sensitive mapping rules, which override the default mapping rules and guarantee that the main sentence prominence is aligned to the focus (see Downing 1970; Bartels 1999; Watson and Gibson 2004; Csirmaz 2005; Selkirk 1984, 2011; Truckenbrodt 2007, 2012, 2013; Bocci 2013). Topic constituents in the left periphery also bear specific pitch accents and are often phrased apart from the rest of the sentence (see a.o. Neeleman and Reinhart 1998; Frascarelli 2000, 2008). In fact, both intonations are directly read off by the different syntactic positions the phrases occupy in the left periphery. Following the Cartographic approach, we

6 An asterisk (*) after the Topic projection indicates the possibility for the topic to be iterated.
7 In Rizzi (1997) and Frascarelli (2008) focus positions can be surrounded by multiple topic positions, both on the left and on the right side. For further development of the analysis of the left periphery see Benincà (2001, 2004), Benincà and Poletto (2004).

assume that the wh-word in regular wh-questions is moved to the left periphery of the sentence to check its informational focus features in a specifier-head configuration. In this framework, Belletti (2001, 2004) shows that the area immediately above VP displays a significant resemblance with the left periphery of the clause.[8] In particular, Belletti identifies a clause internal focus position followed by a clause internal topic position, that is a focus and a topic projection in the low periphery, i.e. the low part of the clause, right above the VP and within the IP:

(9) $[_{\text{High Periphery}}$ CP [IP $[_{\text{Low Periphery}}$[Low Focus] [Low Topic]] [[vP] [VP]]]

A frequent observation in the literature is that a postverbal subject is focalized, i.e. it carries the new information (informational focus):

(10) A: *Chi* *è* *partito?*
who be.PRS.3SG leave-PST.PRT
'Who left?'
B: (i) *È* *partito* *Gianni.*
be.PRS.3SG leave-PST.PRT Gianni
(ii) *#Gianni* *è* *partito.*
Gianni be.PRS.3SG leave-PST.PRT
'Gianni is left'

(11) A: *Chi* *è?*
who be.PRS.3SG
'Who is he?'
B: (i) *Sono* *Gianni.*
be.PRS.1SG Gianni
(ii) *#Gianni* *sono.*
Gianni be.PRS.1SG
'It's Gianni'

Belletti (2001, 2004) shows that the postverbal subject is in a very low position within the hierarchy of functional structures, testing its position with respect two adverbs *completamente* 'completely' and *bene* 'well' and a quantifier *tutto* 'all'. She based her argumentation on Cinque's (1999) typology, in which the adverbs and the quantifier in (12) and (13) are in the specifiers of the lowest different functional projections which build up clause structure. Although the

8 For a first formulation of a similar proposal assuming the presence of a clause internal focus position see Belletti and Shlonsky (1995), Ndayiragije (1999), Jayaseelan (2001).

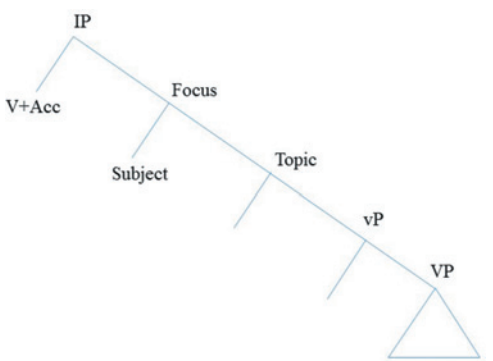
sentences in (12a–b) are not perfectly felicitous, they are definitely better than those in (13a–c).[9] These examples show that the subject must occupy a position lower than the functional positions occupied by the adverbs, which is very low in the clause structure (see also Cardinaletti 2001):

(12) a. ?*Capirà* *completamente* *Maria*.
Understand.FUT.3SG completely Maria
b. ?*Capirà* *bene* *Maria*.
Understand.FUT.3SG well Maria
c. Capirà tutto Maria.
Understand.FUT.3SG all Maria

(13) a. **Capirà* *Maria* *completamente*.
Understand.FUT.3SG Maria completely
b. **Capirà* *Maria* *bene*.
Understand.FUT.3SG Maria well
c. **Capirà* *Maria* *tutto*.
Understand.FUT.3SG Maria all

Belletti (2001, 2004) proposes that the low position occupied by the postverbal subject is not in its original VP internal position, otherwise it would not be clear how the subject is licensed in that position (for the Extended Projection Principle the subject must move up to check its Case feature). Instead, according to Belletti's hypothesis, the subject fills the specifier of a focus projection very low within the IP: the subject moves to the specifier of (informational) focus projection and the verb raises higher up to IP position yielding the order verb–subject:

(14)



9 Examples (12) and (13) are from Belletti (2004).

The role of focus in licensing the postverbal subject, in fact, seems entirely justified by the hypothesis from the informational point of view.

Interestingly, Belletti (2004: 17) also points out that partly different intonations and interpretations are associated to these positions within the low periphery as opposed to the parallel positions in the left periphery. However, Belletti does not attempt at a systematic investigation of the various detectable differences holding between the left peripheral positions and the clause internal parallel periphery, mainly concentrating her attention on the properties of the clause internal focus. Crucially, Belletti identifies the low focus position as having the interpretative properties of an informational focus (as in contexts illustrated in examples [10] and [11]).[10] However, if it is possible to establish a parallelism between high and low periphery, then it is plausible to postulate the possibility of having distinct focus positions that have different prosodic properties, which correspond to different interpretative characteristics. As a matter of fact, a number of researches (De Lancey 1997, 2001; Benincà 2004; Benincà and Poletto 2004; Brunetti 2009; Paoli 2009; Cruschina 2012; Cruschina et al. 2015; Bianchi et al. 2015; Jiménez-Fernández 2015; Rizzi and Belletti 2017) have demonstrated that in the left periphery it is possible to distinguish at least three types of focus, which correspond to different prosodic properties: contrastive/corrective focus, MirF and informational focus.[11] On the basis of these considerations, in the following sections we will explore the syntactic properties of the wh-word in echo wh-questions. We propose that the wh-word in echo wh-questions occupies a low focus position *à la* Belletti (2001, 2004). We also argue that this position has syntactic properties that, interlaced together with the prosodic properties, lead us to define the projection as a dedicated focus projection for MirF. In other words, we advance the proposal that, in echo wh-questions, the focus projection activated within the low periphery is distinct from the informational focus projection identified for the subject in Belletti's analysis.

10 For instance, see also cases of sentences with VOS order, in "prototypical" situations as the live radio broadcasting of soccer games, "where VO pictures a typical situation in the games and counts as if it were taken from a given list of possibilities" (Belletti 2005: 38):

(i) Protegge l' uscita del portiere il terzino sinistro.
Protect.PRES.3SG the coming out of-the goal keeper the left-back
'Protects the coming out of the goal keeper the left-back.'

11 See Jiménez-Fernández (2015) for a detailed discussion on the different interpretive and syntactic properties that can be employed to discriminate between contrastive/corrective focus and MirF.

3.2 Echo focus in the low periphery

So far, we have defined interrogatives like in (1) as echo wh-questions with a wh-word *in situ*. Commonly, a constituent is defined as *in situ*, when it occupies its thematic position, without undergoing any syntactic movement. Italian is a language classified as SVO, i.e. the regular position of the object in the nuclear sentence is on the right of the verb. In other words, the thematic position of the direct object is licensed by the preceding verb. However, in regular information-seeking wh-questions, the wh-word undergoes syntactic movement to the beginning of the sentence, so the wh-word is *ex situ* (moved).[12] Along the basic lines of Rizzi (1997) and subsequent work, we assume that in regular information-seeking wh-questions, the wh- is moved to the beginning of the sentence, i.e. to the specifier of an (informational) focus projection within left periphery. In this way, the wh-word checks the informational focus features, that is, its pragmatic and semantic properties as focus. On this ground, if we compare a regular wh-question such as (15a) with an echo wh-question such as (15b), we conclude that the wh-word undergoes a syntactic movement in (15a), whereas it stays *in situ* in (15b):

(15) a. *Chi hai incontrato alla festa?*
who have.PRS.2SG meet.PST.PRT at-the party
'Who did you meet at the party?'
b. *Hai incontrato CHI alla festa?*
have.PRS.2SG meet.PST.PRT whom at-the party
'You met WHO at the party?'

However, if we assume that the wh-word in echo is *in situ*, we cannot explain cases such as (16), in which the subject wh- *chi* 'who' is clearly *ex situ*, since it appears in postverbal position after a transitive predicate:

(16) *(Le) vende CHI le vongole?*
CL.3PL sell-3SG who the clam-PL
'WHO sells (them) the clams?'

To explain the word order in echo wh-questions as in (16) above, notice that in Italian unmarked sentences, the direct object can precede the subject only marginally:

12 The position of the wh- item is subject to parametric variation. For instance, in Chinese the wh-word is mandatorily realized *in situ*, while in French both the orders are possible.

(17) */??*Ha mangiato il maiale Gianni*[13]
have.3SG eat-PST.PRT the pork Gianni
*/?? '[He] has eaten pork Gianni'

On the basis of Belletti's analysis illustrated above, the sentence in (17) is not acceptable because *Gianni* is the subject that occupies a low focus position and interferes with the movement of the verb and its object to the IP. If we substitute the object *maiale* 'pork' with a wh-word, the sentence is still strongly marginal, because a regular question (that is, a sentence with an informational focus) with a wh-word that is not moved to the left periphery, is not acceptable in Italian:

(18) */??*Ha mangiato cosa Gianni?*
Have.3SG eat-PST.PRT what Gianni
Lit. '(He) has eaten what Gianni?'

The only possible way to turn the example (18) into an acceptable question is uttering it with a strong accent on the wh-item, which necessarily gives an echo wh-question interpretation as exemplified in (19).

(19) *Ha mangiato COSA Gianni?*
Have.3SG eat-PST.PRT what Gianni
Lit. '(He) has eaten WHAT Gianni?'

An explanation for this phenomenon could be that *cosa* 'what' moves to a focus position in the left periphery followed by the remnant movement of the IP, with the subject stranded in a low topic position or dislocated (cf. Frascarelli 2000, 2008). Moreover, due to the prosodic prominence on *cosa* 'what', we could also advance the hypothesis that the focus position where the wh-word moves to is a MirF position (Bianchi et al. 2015). This analysis is supported also by the possibility of producing an echo wh-question with a fronted wh-word, such as in:

(20) *COSA ha mangiato Gianni?*[14]
What have.3SG eat-PST.PRT Gianni
Lit. 'WHAT has eaten Gianni?'

13 The sentence is marginal if read without any breaks or special intonation.
14 For a detailed analysis of Italian wh- echo questions with the fronted wh- see Badan et al. (2017).

Notice that, according to a number of scholars (Cruschina 2012; Bianchi and Bocci 2012; Rizzi 2013; Bianchi et al. 2015; Jiménez-Fernández 2015; Rizzi and Bocci forthcoming; a.o.), MirF can occur in the left periphery of a declarative sentence, as in the following example of fronted MirF (from Rizzi and Bocci forthcoming):

(21) *Indovina un po'!*
guess.2SG-IMP a bit
ALLE MALDIVE sono andati in viaggio di nozze!
To-the Maldive be.3PL go-PST.PRT in honeymoon
'Guess what? TO THE MALDIVES they went on honeymoon!'

Based on cases such as (21) and on the analysis of MirF fronting, it can be hypothesized that also MirF in echo questions, such as in the example (1), is in the left periphery, with the subsequent movement of the rest of the clause to the CP. However, MirF in the left periphery seems constrained to a certain extent. This is shown, for instance, by the fact that other types of focus, such as corrective focus, can appear at the beginning of an embedded clause (see ex. [22] and [23]), whereas it is not possible to have an echo MirF in the same position (24a–c), unless the wh-word appears in postverbal position (24d–h):

(22) *Ho sentito che LA PIZZA ha mangiato*
have.1SG hear-PST.PRT that the pizza have.3SG eat-PST.PRT
(non gli spaghetti)
not the spaghetti
'I've heard that s/he ate the pizza (not the spaghetti).'

(23) *Ho sentito che AL MARE è andato*
have.1SG hear-PST.PRT that to.the sea be.3SG go-PST.PRT
(non in montagna).
Not in mountain
'I've heard that he went to the seaside (not to the mountains).'

(24) a. **Hai sentito che CHI ha comprato*
Have.2sg hear-PST.PRT that who have.3SG buyPST.PRT
le mandorle?
the almond-PL
b. **Hai sentito che COSA Maria si è comprata?*
Have.2SG hear-PST.PRT that what Maria herself be.3SG buy-PST.PRT

c. *Hai sentito che DOVE Maria ha comprato le mandorle?
Have.2SG hear-PST.PRT that where Mari have.3sg Buy-pst.prt the almond-PL

d. Hai sentito che ha comprato le mandorle CHI?
Have.2SG hear-PST.PRT that has buy-PST.PRT the Almond-pl who
'Did you hear that WHO has bought the almonds?'

e. Hai sentito che ha comprato CHI le mandorle?
Have.2sg hear-PST.PRT that has buy-PST.PRT who the almond-PL
'Did you hear that WHO has bought the almonds?'

f. Hai sentito che Maria si è comprata COSA?
Have.2SG hear-PST.PRT that Maria herself be.3SG buy-PST.PRT what
'Did you hear that Mary has bought WHAT?'

g. Hai sentito che Maria ha comprato le mandorle DOVE?
Have.2SG hear-PST.PRT that Maria have.3SG buy-PST.PRT the almond-PL where
'Did you hear that Mary has bought the almonds WHERE?'

h. Hai sentito che Maria ha comprato DOVE le mandorle?
Have.2SG hear-PST.PRT that Maria have.3SG buy-PST.PRT dove the almond-PL
'Did you hear that Mary has bought the almonds WHERE?'

Notice, moreover, that there is a further asymmetry compared to informational focus in regular wh-questions. Firstly, in regular wh-embedded interrogatives, the wh- can appear in sentence initial position, as in (25), whereas, an echo wh- cannot (see ex. [24a–c] above). Secondly, example (25) shows also that when a regular wh-question is embedded, the scope of the question is mandatorily extended to the verb of the main clause and the sentence becomes a yes–no question:

(25) Speaker A: *Hai sentito che cosa si è comprata Maria?*
'Have you heard what Maria bought?'
Speaker B: *Sì, ho sentito.*
'Yes, I've heard.'

In contrast, when an echo question is embedded, the scope of the question remains in the embedded clause, and the whole sentence is still a wh-question:

(26) Speaker A: *Ho sentito che Maria si è comprata un collier di Tiffany*.
'I've heard that Maria bought a Tiffany collier.'
Speaker B: *Hai* *sentito* *che* *Maria*
Have.2SG hear-PST.PRT that Maria
si *è* *comprata* *COSA?*
to.her be.3SG buy-PST.PRT whay
'Have you heard that Maria bought WHAT?'
Speaker A: *Eh sì, proprio un collier di Tiffany*.
'Eh yes, precisely a Tiffany collier.'

Moreover, notice that when the wh- is in postverbal position within an embedded clause, the interpretation is necessarily echo, otherwise the sentence is not acceptable:

(27) **Hai* *sentito* *che* *Maria* *si* *è* *comprata*
Have.2SG hear-PST.PRT that Maria to.her be.3SG. buy-PST.PRT
cosa?
What
'Did you hear that Maria bought what?'

Summing up, these observations indicate that a MirF projection is available in left periphery, in line with the analysis proposed by Bianchi et al. (2015) of fronted MirF. However, the asymmetries in the behavior between echo questions with the wh-word in the beginning of the sentence and echo questions with the wh-word in postverbal position, suggests that there is a position available for MirF also in the low periphery of echo questions.[15,16]

15 In the Cartographic approach, in fact, the postulation of both left and low periphery is not incompatible, consider for instance the informational focus projections postulated in both peripheries. Assuming the Cartographic hypothesis, the two MirF projects in left and low periphery ideally should have different interpretative properties (this should be also valid for the informational focus mentioned above). We leave this issue open for future research.

16 Under the Cartographic approach, the discourse features are checked in a specifier-head configuration, with an XP that moves to the specifier of a topic or focus functional head. However, as an anonymous reviewer suggests, an alternative approach is the notion of agreement as it is proposed by Chomsky (2008) within the Minimalist framework and in line with Jiménez-Fernández and Miyagawa (2014) proposal for some topic constructions in Spanish. The authors argue that when a language is both discourse-prominent and agreement-prominent, both the formal features and discourse features are inherited from C to the phrase that remains within VP.

As further evidence for this proposal, consider also example (28), where the postverbal pronominal subject *lui* 'him' is interpreted as having a strengthening function, often called emphatic.[17] As Belletti (2005) points out, in fact, the strong pronoun *lui* 'him' adds new information concerning the subject, which is provided by its filling the clause internal (specifier of the) focus phrase in the VP periphery. Notice that if the postverbal pronominal subject is licensed in focus position, a direct explanation is provided as to why it must necessarily be realized as strong pronoun, and it cannot be realized as weak pronoun *egli* 'him' (in Cardinaletti and Starke's 1999 sense). Weak pronouns, in fact, are deficient, thus they are incompatible with a saliency feature like focus, so that they make the sentence (28) ungrammatical.

(28) *Gianni parl-erà lui/*egli con Maria.*
Gianni speak-FUT.3SG him with Maria
'Gianni will speak with Maria' (lit. 'Gianni will speak him with Maria')

As a matter of fact, weak pronouns cannot appear in focus context either:

(29) *È andato lui/*egli al mercato non lei.*
be.PRS.3SG go.PST.PRT him to.the market not her
'He went to the market, not her' (lit. 'He went him to the market, not her')

The strong versus weak behavior with respect to the focus interpretation is noteworthy for our analysis, since crucially a wh-word in echo wh-questions cannot be preceded by a strong pronoun, as exemplified in (30). On the one hand, the ungrammaticality of (30) may be due to the fact the strong pronoun *lui* 'him' and *dove* 'where' compete for the same position within the low periphery, that is, the specifier of the focus projection. On the other hand, the ungrammaticality may be due to the fact that *lui* 'him' and *dove* 'where' occupy to distinct focus positions in the low periphery, and it is such a co-occurence of two foci that makes the sentence unacceptable. The recursion of focus, in fact, is banned by the interpretive clash that would arise (Rizzi 1997). Both cases demonstrate that the wh-word occupies a focus position in the low periphery.

17 Notice that, as for the pronoun, we speak about *emphatic* and not contrastive function. To our knowledge, accurate studies on the nature of the emphatic function of the strong pronoun and the interlace with its prosodic properties in a structure like (28) are still needed.

(30) *Gianni andr-à lui DOVE?[18]
Gianni go-FUT.3SG him where

Notice moreover that, as in echo wh-questions like in (19) above (repeated here in [31a] for the reader's convenience), also in regular information-seeking wh-questions as in (31b), the subject must appear at the end of the sentence, otherwise the sentence is ungrammatical (cf. [31b] with [31c] and [31d]).

(31) a. *Ha mangiato COSA Gianni?*
Have.3SG eat-PST.PRT what Gianni
Lit. '(He) has eaten WHAT Gianni?'
b. *Cos' ha mangiato Gianni?*
What have.3SG eat-PST.PRT Gianni
'What has Gianni eaten?'
c. **Cosa Gianni ha mangiato?*
What Gianni have.3SG eat-PST.PRT
d. ??*Gianni cos' ha mangiato?*[19]
Gianni what have.3SG eat-PST.PRT

This observation[20] is crucial because it shows that while in regular wh-questions, the wh-word is the information focus word and must appear in a focus position at the beginning of the sentence. In echo wh-questions the wh-word is a focus, but of a different type, and it can fill a position within the low periphery.

Finally, additional evidence to postulate that MirF in echo wh-questions is in a low position within the clause is based on a parallel with the test with low adverbs and quantifiers proposed by Belletti (2001, 2004) for subjects, as shown in examples (13b–c) (here repeated as [32b] for the reader's convenience). As a matter of facts, the MirF in echo questions, on pair with postverbal subjects,

18 As an anonymous reviewer remarks, in topic chains the strong pronoun *lui* can be prosodically weak (see Frascarelli 2007, 2017; Bianchi and Frascarelli 2010). Hence, sentences like (30) is acceptable, if the pronoun *lui* is low-toned. This very useful observation and the grammaticality of (30) with a low-toned *lui* is a further evidence for claiming that DOVE is in a focus position. Firstly, being prosodically weak, *lui* is not a focus thus its position does not compete with the focus position occupied by DOVE; secondly the low-toned *lui* must be in a topicalized position (as *lui* is analyzed as a Given-Topic by the authors cited above) preceding the focus position, in line with the hierarchy of topic and focus positions in the low periphery proposed by Belletti (2001, 2004).

19 The question in (31d) is acceptable only if Gianni is a topic. If it is uttered out of the blue as a regular information-seeking wh-question is (at least) infelicitous.

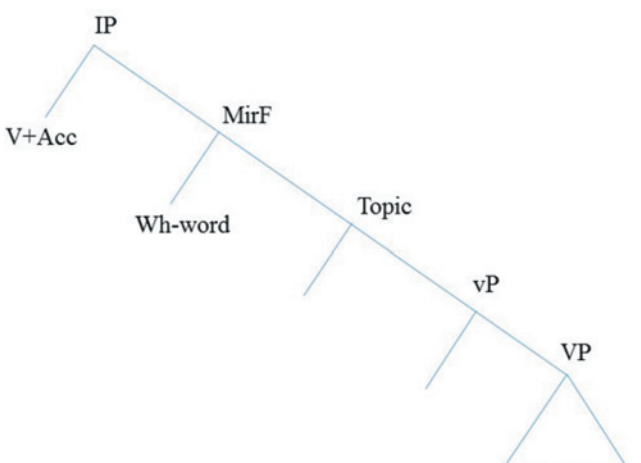
20 We owe this observation to Adriana Belletti.

cannot be followed by adverbs such as *bene* 'well' or quantifiers such as *tutto* 'all', which are very low in the hierarchy proposed by Cinque (1999).

(32) a. *Capirà* *bene/tutto* *Maria*
Understand-FUT.3SG well/everything Mary
Lit.: '(She) will understand well/everything Mary'
b. **Capirà* *Maria* *bene/tutto*
Understand-FUT.3SG Mary well/everything
c. **Ha* *spiegato* *COSA* *bene?*
Have.3SG explain-PST.PRT what well
d. **Ha* *spiegato* *CHI* *tutto?*
Have.3SG explain-PST.PRT who everything
e. *Ha* *spiegato* *bene* *COSA?*
Have.3SG explain-PST.PRT well what?
Lit.: '(He) has well explained WHAT?
f. *Ha* *spiegato* *tutto* *CHI?*
Have.3SG explain-PST.PRT everything who
Lit.: 'WHO has explained everything?

We propose that the wh- in echo wh-questions fills a focus projection in the low periphery (with the successive remnant movement of the IP), which is distinct from the informational focus and does not correspond to a contrastive/corrective focus (see the syntactic representation of our proposal in [33]). The wh-word in echo wh-questions, in fact, has specific prosodic properties that yield a specific interpretation: the MirF.

(33)



4 From syntax to prosody

In what follows we present two prosodic production experiments conducted in the framework of the Autosegmental–Metrical (AM) theory (Pierrehumbert 1980 and subsequent work; cf. Ladd 2008[1996]). We investigate the prosodic properties of wh-words in utterances expressing informational, mirative and corrective focus. In experiment 1, we compare echo questions with regular information-seeking wh-questions. In experiment 2, we compare echo wh-questions with declarative utterances with corrective focus. As mentioned in the introduction, we analyze echo wh-questions in which the wh-word is a locative adjunct, such as (34):

(34) *Le vendono DOVE le mandorle?*
cl.OBJ.3PL sell.PRS.3PL where the almonds
'They sell (them) where the almonds?'

We will compare echo wh-questions such as (34) with regular wh-questions such as (35), and with corrective statements such as (36):

(35) *Dove vendono le mandorle?*
Where sell.PRS.3PL the almonds
'Where do they sell the almonds?'

(36) *(No), guarda che vivono a Milano.*
No look.PRS.2SG that live.PRS.3PL in Milan
'(No) look that they live in Milan.'

Along the lines of the Cartographic approach, we expect that the focus in echo wh-questions such as (34), due to its different interpretive properties, is characterized by specific prosodic features, beside occupying a different syntactic position with respect to other types of focus such as those exemplified by (35) and (36). Following the system of default syntax–prosody mapping rules proposed by Selkirk's (a.o. 2000, 2005, 2011), as applied to Italian by Bocci (2013), we assume that, in unmarked syntactic and pragmatic conditions, the maximal projection XP of a syntactic head is mapped onto a phonological phrase φ, a sentence is mapped onto a intonational phrase ι, and the utterance onto a prosodic utterance υ.[21] Default mapping

21 In neutral conditions, therefore, we can expect that each XP included in the sentence is phrased in a separated phonological phrase φ. However, we point out that, in certain

rules can be overruled in pragmatic and syntactic conditions in which discourse-related properties induce a specific interpretation at syntax–prosody interface.

In sentences such as (34), the presence of a d-linked object resumed by a clitic pronoun on the right of the wh-locative, i.e. in sentence final position, gives us the possibility to observe prosodic properties overarching a wider periphery. Notice that the prosodic properties of a clitic-right dislocated object in a declarative sentence are well known and have been also experimentally investigated (a.o. Rossi 1999; Crocco 2013; cf. also Ashby 1994 on French), while the properties of the same constructions in interrogative contexts are much less studied. Generally speaking, a right-dislocated post-focal object in declaratives is a familiar topic (Frascarelli 2000, 2008), prosodically characterized by a flat intonational contour. Experimental investigations by Bocci (2013) have shown that the post-focal stretch is fully phonologically represented on the metrical and tonal level, and surfaces as flat pitch which can be interpreted as a (sequence of) L* tone(s). As for interrogatives, right dislocations of the direct object in yes–no questions show a strong asymmetry compared to their declarative counterparts. In fact, in yes–no questions, the main prominence can be realized on sentence-final object, despite the presence of a resumptive clitic (Crocco 2013). Therefore, as suggested by Samek-Lodovici (2015: 78) "right-dislocation in yes-no questions [...] [could have] very different properties and [...] [could] constitute a distinct process serving a separate discourse function". By examining a clitic right dislocation of the direct object in echo wh-questions, we aim at fostering our understanding of their prosodic properties.[22]

The two experiments illustrated in the Sections below aim at examining the following prosodic properties: (a) the placement of the main prominence in the sentence, (b) its possible association to the wh-word, (c) the post-focal prosody, (d) the alignment and scaling properties of the relevant tonal events, and (e) the internal phrasing of the utterance.

conditions, two adjacent φ can be restructured and form a single constituent. For instance, this is the case of a non-branching predicate and the following direct object in SVO sentences, in which the whole VP can be prosodically realized as one φ (Nespor 1993; Frascarelli 2000). In addition to this, D'Imperio et al. (2005) showed that Italian, as long as other Romance varieties, privileges either (SVO) or (S)(VO) phrasings across several phonological and syntactic conditions involving constituent length and branching.

22 We remain agnostic as for the structural position of the right-dislocated object. We leave this issue open for future research.

4.1 Prosodic experiment 1: echo *vs*. information-seeking wh-questions

The goal of experiment 1 is to compare the prosody of regular information-seeking wh-questions with the prosody of echo questions expressing MirF. More specifically, the analysis aims at describing the overall intonation structure of this type of sentences with respect to the placement of the main prominence, internal phrasing, shape of the pitch accents and prosodic properties of the wh-item. We have carried out a production experiment with a group of native speakers of Italian from the city of Este (Veneto region, Northeast Italy). Notably, since no studies have been carried out so far in the AM framework on the wh-questions in Veneto Italian, this experiment will also provide a description of the intonation features of this utterance type in this regional variety (cf. Crocco and Badan 2016).

4.1.1 Verb adjacency and prosody in Italian regular wh-questions

According to Ladd (2008[1996]), Marotta (2002), Rizzi (2001), Bocci (2013), Italian wh-elements are not homogeneous as for their prosodic and syntactic properties. Rizzi (2001) identifies two classes of wh-words, distinguished by their position with respect to the verb. Italian wh-elements can be adjacent to the verb depending on the wh-item, as in the following examples:

(37) a. *Perché Maria compra il pane ogni giorno?*
why Mary buy-PRS.3SG the bread every day
'Why does Mary buy bread every day?'
b. *Chi compra il pane ogni giorno?*
who buy-PRS.3SG the bread every day
'Who buys bread every day?'
c. *Dove compri il pane?*
where buy-PRS.2SG the bread
'Where do you buy bread?'

Whereas wh-words such as *perché* 'why' do not require verb adjacency, other elements, such as *chi* 'who' and *dove* 'where' do. Italian wh-elements also display different prosodic properties with respect to their capacity to bear the main prominence of the utterance. As suggested by Ladd (2008[1996]) and subsequently experimentally demonstrated by Marotta (2002) and Bocci (2013), wh-items that do not require verb adjacency can bear main

prominence, whereas those requiring verb-adjacency cannot. Therefore, main prominence associates with the wh-word in a sentence with *perché* 'why', while this does not happen in sentences with other wh-words such as *chi* 'who', *dove* 'where' or *quando* 'when'. Moreover, evidence on Sienese Italian (Bocci 2013), shows that main prominence in information-seeking wh-questions is normally associated to the verbal predicate. According to Bocci (2013), in this case the main prominence is assigned to the verb by feature-sensitive mapping rules, by virtue of an uninterpretable focus feature the verb is endowed with.

It is worth pointing out that the experimental evidences provided by Marotta (2002) and Bocci (2013) have been collected by analyzing samples produced by Tuscan speakers from Lucca and Siena. Since standard Italian is based on the Tuscan variety, one could be tempted to extend Marotta's and Bocci's results and analysis *ipso facto* to the Italian language as such. However, it is well known that all Italian native speakers have a – stronger or lighter – regional accent (Canepari 1999; Crocco 2017). Therefore, a prosodic analysis of Italian must take regional variations into account, since the regional varieties may differ from one another at the phonological level, and especially from the prosodic point of view (see a.o. Gili-Fivela et al. 2015). Against this background, it is important to verify the possibility of extending the analysis proposed for Tuscan Italian to the variety that is under investigation in this article, which is the regional Italian spoken in the town of Este. More specifically, in the experiment 1, we examine the prosodic features of questions containing the wh- *dove* 'where', therefore contributing to the prosodic analysis of wh-word requiring verb adjacency.

4.1.2 Experimental procedure

For the first experiment, we recorded four speakers (one male and three female) from the city of Este, age ranging from 30 to 40 with university-level education. The speakers are identified with letters such as: A, C, S (female speakers) and L (male speaker). The recordings have been made in a quiet room using a Røde HS1-P headset microphone plugged into a portable Marantz PMD 620 recorder. Each speaker has been recorded twice, in separated sessions. Each recording has taken approximately half an hour. The data have been elicited using a reading task based on the questionnaire designed to collect the material of the Interactive Atlas of Romance Intonation (IARI: Frota and Prieto 2015). The adopted elicitation technique

ensures a good control of the syntactic, phonological and pragmatic variables at stake, while at the same time preserving a certain degree of naturalness in the speaker's production, by presenting the target stimuli in an appropriate pragmatic context. The speakers have been asked to read silently a series of short situational prompts followed by a sentence to be read aloud. The speakers have been left alone during the recording sessions after receiving instructions about the task from one of the authors.

The task consisted in 78 prompts/sentences presented in a in a Microsoft PowerPoint slideshow. The speaker could read the prompts at his/her pace, and read aloud a sentence more than once if necessary. Among the 54 sentences, 15 were target sentences and the others were fillers mostly taken from the Italian IARI questionnaire (Gili-Fivela et al. 2015). The complete corpus contained 312 utterances, 80 of which were target sentences (wh-questions).

The target sentences were wh-questions containing *dove* 'where', with a transitive verb (V) followed by a direct object (NP). The phonological structure of the word composing the target sentences has been controlled for number of syllables, stress position and syllabic structure. The verb was the same form *vendono* 'they sell', (sell-PRS.3PL) in all the cases. The direct object NP was a trisyllabic word with antepenult stress, such as *mandorle* 'almonds' or *dondoli* 'porch swings'. The stressed syllable is CVC with a voiced consonant onset and a nasal coda. Some examples of the target sentences are illustrated in (38):

(38) a. *Dove vendono le mandorle?*
where sell-PRS.2PL the almond-pl?
'Where do they sell the almonds?'
b. *Le vendono DOVE le mandorle?*
them sell-PRS.2PL where the almond-pl?
'They sell the almonds WHERE?'

We analyzed the corpus using Praat (6.0.20, Boersma and Weenink 2016). As a preliminary step, each utterance has been visually and auditory examined to perceptually evaluate main prominence and phrasing phenomena. Subsequently, the target sentences have been phonetically segmented by hand at the phonetic and word level. The stressed syllable and vowel of verbs and NPs have been labeled. To measure alignment properties, excursion and slope of pitch accents and edge tones, we have labeled the position of the f_0 targets. The labeling has been then converted in an R data table, which has been used for the statistical analysis.

4.1.3 Results: Regular information-seeking wh-questions

Regular wh-questions in Este Italian can be produced with different tunes. In the majority of the cases (37 out of the 40 examined here), information-seeking wh-questions present two major pitch movements, the first of which is located in the area of the wh-word, while a second can occur on the last lexical word of the utterance (see Figures 4 and 5). In three utterances produced by speaker S, the first pitch movement is clearly located on the verb, while no relevant movement is observable on the wh- (cf. Figure 4).

In the following description, we will give more space to the first accent because of its relation to the wh-word. The description of the second accent will be less detailed.

The first accent is a falling sequence of two tonal targets H (mean f_0 for female spks. = 348 Hz; male spk. = 176 Hz) and L (mean f_0 for female spks. = 190 Hz; male spk. = 97 Hz). Mean H to L excursion is 158 Hz (fem. spks.) and 78 Hz (male spk.). H target occurs on the post-stress vowel [e] of wh- *dove* 'where' (avg. 21 ms before the onset of the stressed syllable *ven*). L occurs on the nasal coda of

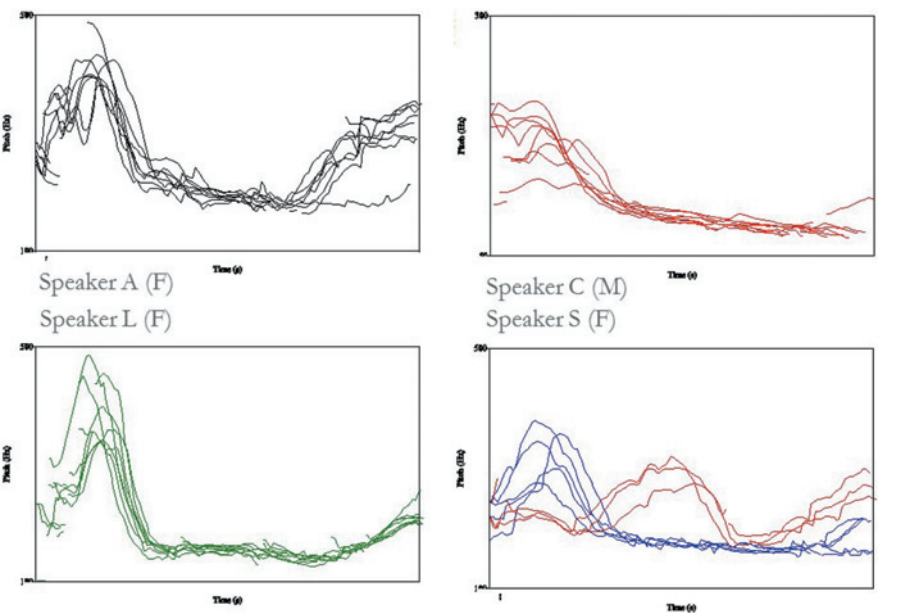


Figure 4: Plots of the examined utterances grouped by speaker. Speaker S produces two prosodic variants, with a peak corresponding to the area of the wh-word (blue plots) and with the peak in the area of the verb (red plots).

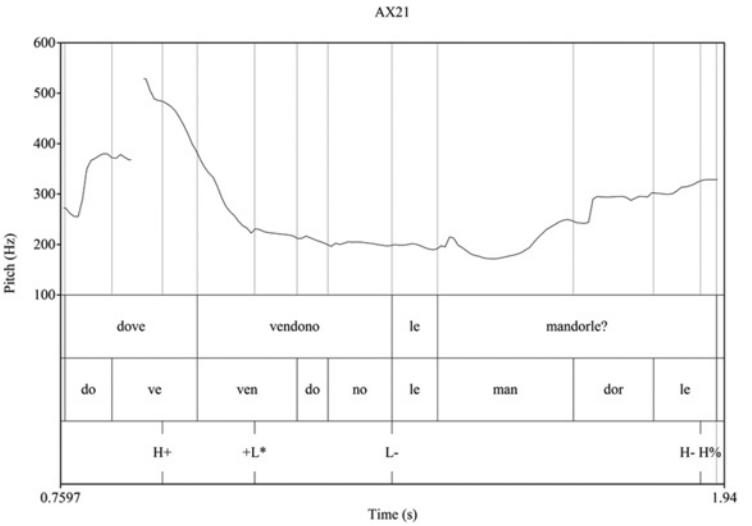


Figure 5: Wh-question *Dove vendono le mandorle?* Speaker A (female).

the stressed syllable *ven* of the verb (avg. 162 ms after syllabic onset, 121 ms after vowel onset and 39 ms before syllable offset).

We analyze the H L sequence as a bitonal pitch accent H + L*, since the pitch movement is perceptually descendent and L is the most prominent target from a perceptual point of view (Prieto et al. 2005).[23] Moreover, L is phonetically aligned within a metrical stress, i.e. the stressed syllable of the verbal predicate, while this is not the case for H, which occurs on the last unstressed vowel of the wh-word (cf. Figure 6). Based on both alignment properties of the targets and perceptual evaluation, we conclude that this accent is not associated to the wh-word but to the verb.[24] Notice that in most cases this pitch accent is the main perceptual prominence of the utterance.

On the rhythmic level, there are no internal boundaries appreciable by listening. Nevertheless, the low plateau following the pitch accent is compatible with the presence of an L-edge tone. This internal boundary is marked on the tonal tier, but not on the metrical tier, and divides the intonational phrase into

23 We analyze bi-tonal accents in terms of relative strength between the two tones, assuming that the perceptual prominence reflects phonological association.

24 A further argument in favor of the association of H + L* to the verb comes from the 3 utterances with a different tune produced by S (Figure 4, red plots). In these utterances is evident that a pitch accent is on the verb, while the wh- does not bear any visible pitch movement.

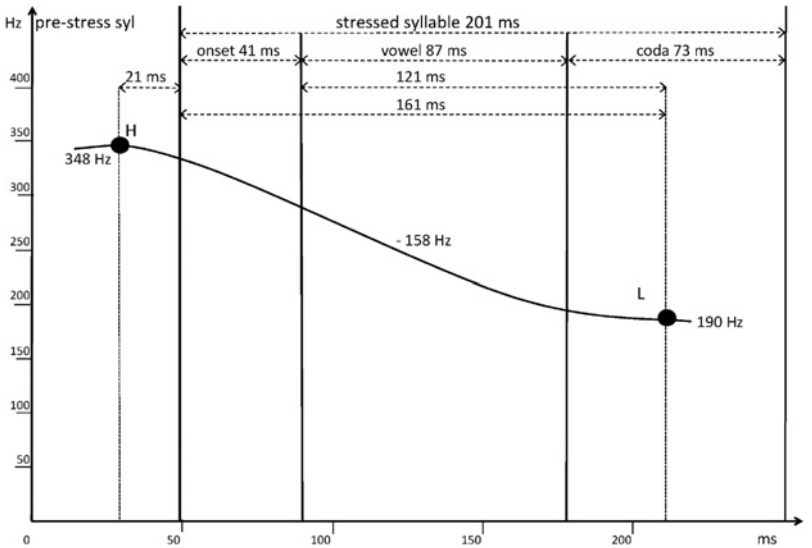


Figure 6: f_0 values and alignment properties of H and L in the first pitch accent of regular wh-questions. f_0 Values are referred to the female speakers. Labels *pre-stress* and *stressed syllable* are referred to the verb *vendono* 'sell'. The label *pre-stress syllable*, therefore, indicates the syllable *–ve*, i.e. the last, unstressed syllable in the wh- *dove* 'where'.

two minor prosodic constituents φ. Notice that a similar tonal boundary has been observed by Bocci (2013: 170) in regular wh-questions in Tuscan Italian.

The prosodic realization of the second phrase corresponding to the direct object NP is more variable. In our corpus, we found three different realizations of the final accent and the following edge tones. As previously mentioned, in this paper we only provide an outline description of the final tune of regular wh-questions. In (39) we propose the following provisional analysis of the three final wh-tunes found in the corpus:

(39) a. L*+H H%
b. L* L%,
c. L* LH%

These patterns are illustrated by the examples in Figures 7–9.[25]

25 Note that occasionally a wh-questions can have a final H + L* in the examined variety. Tunes similar to those observed in Este Italian have been observed in several Italian varieties (Gili-Fivela et al. 2015). In particular, tunes of the type H + L* LH% occur in Milanese, Turin,

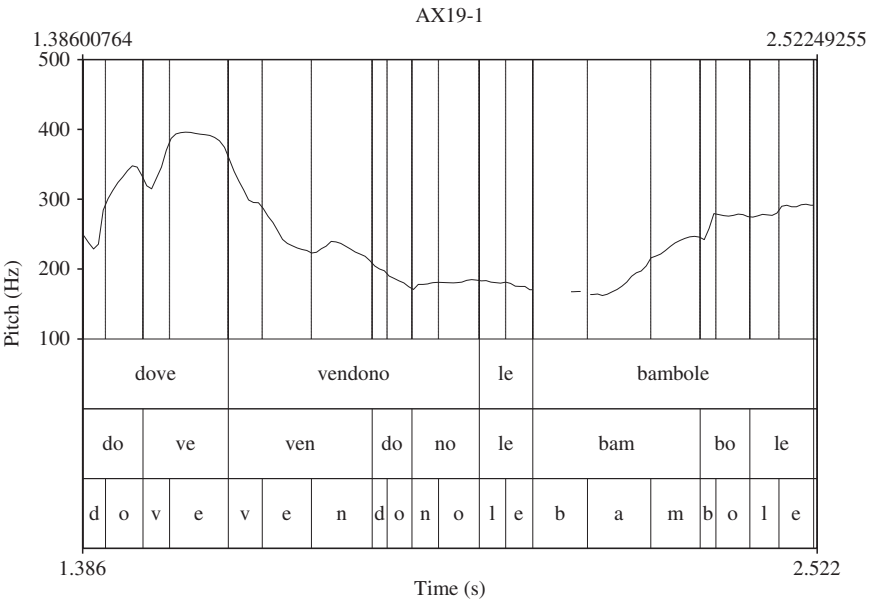


Figure 7: Wh-tune L* + H H%. Female speaker (A).

In conclusion, the results of experiment 1 on regular wh-questions indicate that the prosodic properties of the wh-word *dove* 'where' in Este are comparable to those of wh-items requiring verb adjacency in Tuscan Italian. In fact, strong similarities emerged between the two varieties: firstly, the presence of two relevant pitch accents in the tune is coherent with the picture based on the Tuscan varieties. Secondly, an intermediate phrase boundary L- is inserted after H + L*, as in Sienese Italian. This phrasing is compatible with a basic mapping of XP = φ without internal restructuring of VO. Finally, H + L*, while occurring 'in the area' of the wh-word, is associated to the verb. This result confirms the analyses by Marotta (2002), and Bocci (2013) on Tuscan and allows its extension to Este Italian.

Before moving to the next experiment, in (40) we present a summary of the syntactic and phonological structure of the regular information-seeking wh-questions examined in this section:

Lucca, Florentine, Sienese, Roman, Salerno, Bari and Cosenza Italian; H + L* L% has been found in Milanese, Turin, Pisa, Lucca, Sienese, Roman, Neapolitan, Pescara, Cosenza, Salerno, Bari and Lecce Italian; and L* + H H% occurs in Pescara and Salerno Italian.

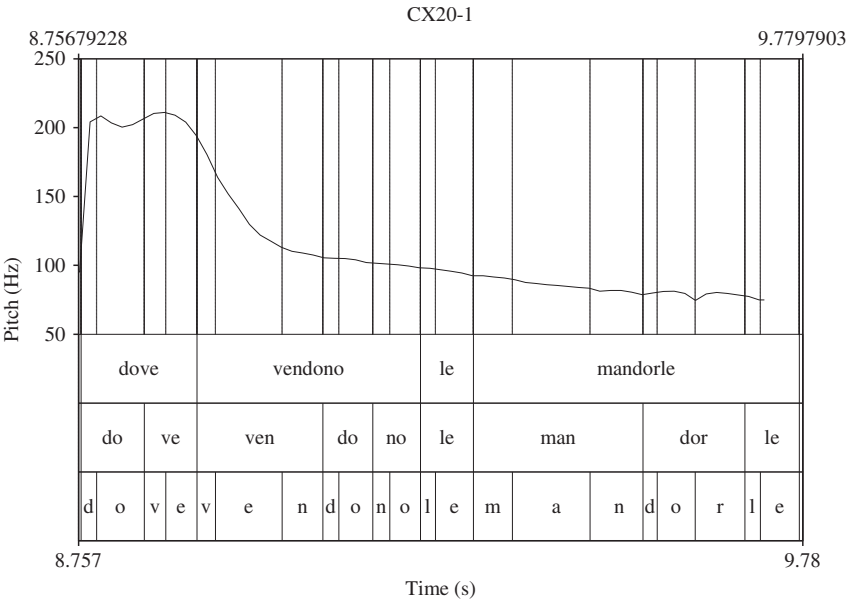


Figure 8: Wh-tune L* L%. Male speaker (C).

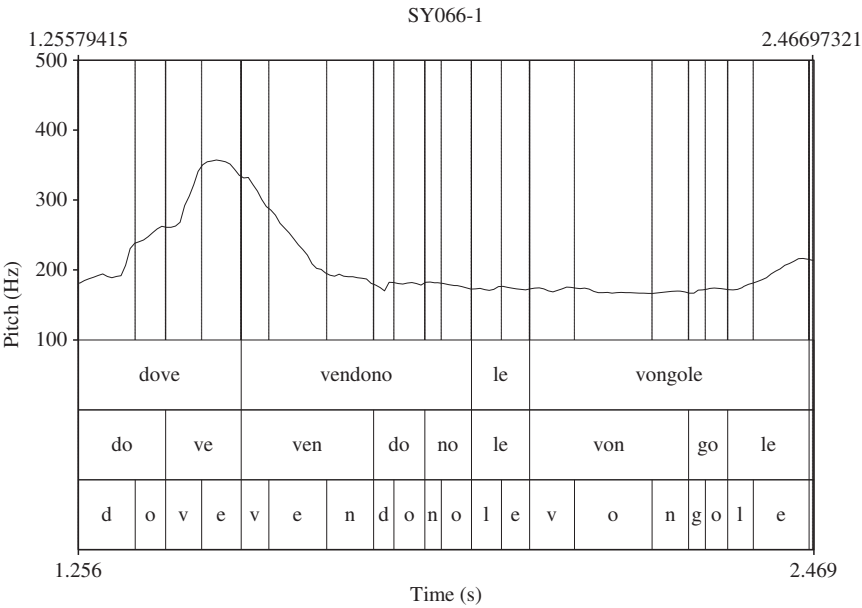


Figure 9: Wh-tune L* LH%. Female speaker (S).

(40)

				L* + H	H%
				L*	LH%
		H + L*	L-	L*	L%
	{[(*Dove*	*vendono*)φ		(*le mandorle?*)φ]ι	}υ
[LP[FocusP	*Dove*]]	[IP *vendono*		*le mandorle?*]	
		*		*	
		*			
		*			

4.1.4 Results: MirF in echo wh-questions

Echo wh-questions expressing MirF are characterized by the presence of two large pitch movements, located respectively on the wh-item and on the last word of the utterance. Even if these pitch movements are both prominent, main perceptual prominence clearly corresponds to the wh-word. In the following description, we will focus on the first pitch movement, corresponding to the prominence on the wh-item. A prosodic analysis of the complete utterance is provided in Crocco and Badan (2016).

All echo wh-questions of the corpus are consistently produced with the same tune, with no relevant variants. The plots presented in Figure 10 and in

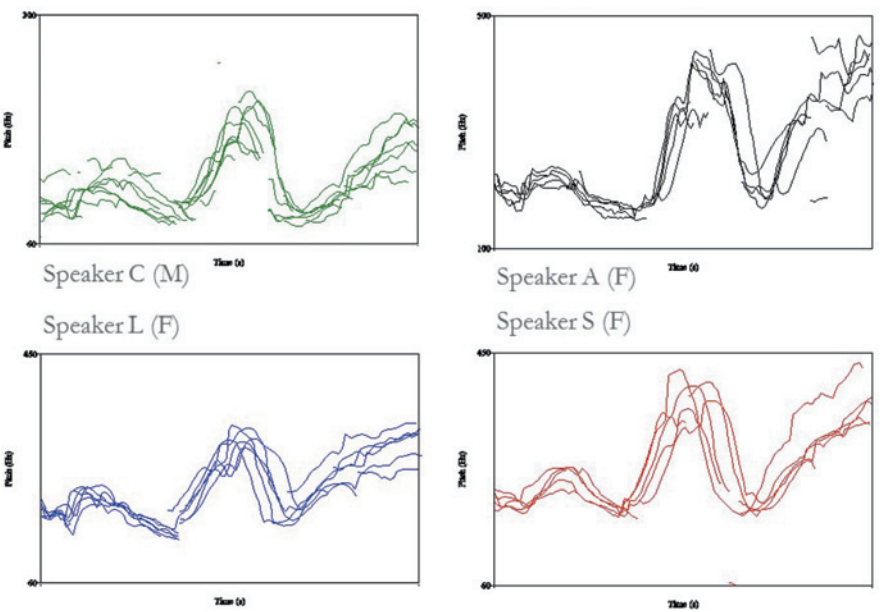


Figure 10: Plots of echo wh-questions grouped by speaker.

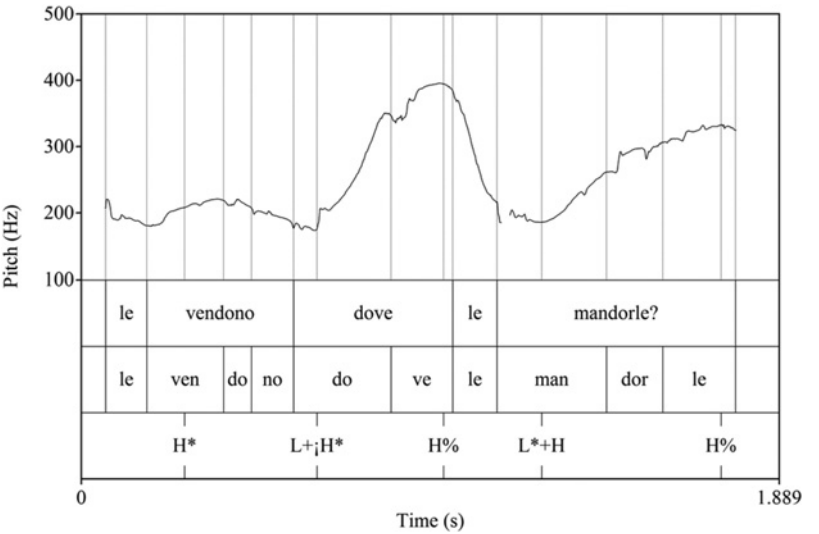


Figure 11: Echo wh-question *Le vendono DOVE le mandorle?* Female speaker (S).

the example in Figure 11 show the pattern used by the informants for the production of echo wh-questions such as *le vendono DOVE le mandorle?* 'They sell WHERE the almonds?'.

Echo wh-questions are perceptually phrased into two units, with a boundary after the wh-item separating the utterance into two intonational phrases. Notice that this boundary can be the result of the clitic right dislocation of the direct object, since there is evidence that, at least in declarative utterances, a right-handed topic in Italian is phrased apart from the preceding material, in a separated ι (cf. Frascarelli 2000, 2008). In echo wh-questions, however, the presence of the boundary after the wh- could be also independently motivated. The following example in Figure 12 shows the prosodic pattern of an echo wh-questions containing the ditransitive predicate *dare* 'to give'. In this example, the indirect object *a Valerio* 'to Valerio' occurs its argument position after the direct object and no resumptive clitic is present. Nevertheless, also in this case the peak on the wh-word (which corresponds to the direct object wh- *cosa* 'what') is followed by a steep lowering and by a perceptual disjuncture, as in the data presented in Figure 11. This observation suggests that the boundary after the wh-echo word in the case presented in Figure 11 cannot be a consequence of the presence of the clitic. In fact, independently from the presence of a resumptive pronoun, the constituents appearing after the focused in Figures 11 and 12 are prosodically detached (or extraposed, see Frascarelli 2000).

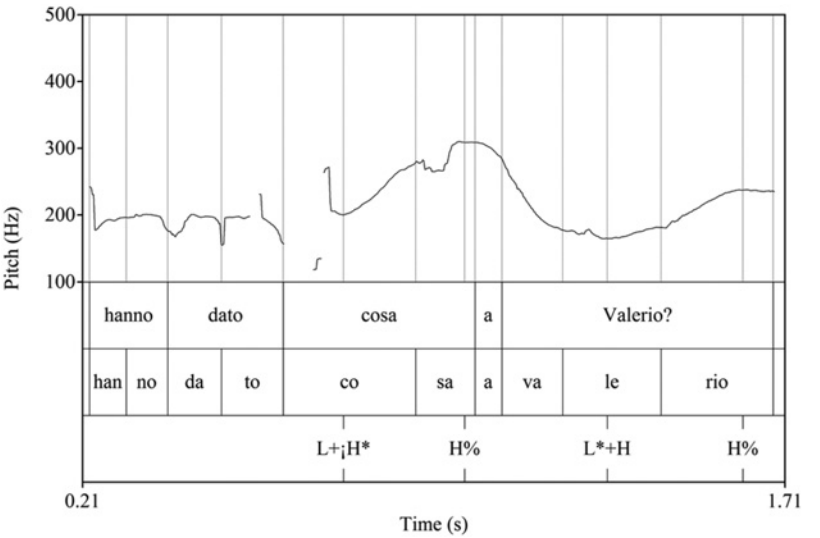


Figure 12: Echo wh-question *Hanno dato COSA a Valerio?* Female speaker (L).

Apart from the boundary after the wh-word, in the examined echo wh-questions with right dislocation there are no other audible internal boundaries: in particular, the verbal predicate is not separated from the following wh-. Note that the same holds true either if the echo question includes a branching or non-branching predicate, as in the following further example (Figure 13).

Notice that the absence of a boundary between the verbal predicate and the wh-word is in favor of the low periphery analysis proposed above (Section 3.2). In fact, the wh-word and the predicate are in one intonational phrase, which indicates that they are couched in the maximal projection of V or, in Frascarelli's (2000) terms, within the "sentential ι". Therefore, we can provide the following phonological analysis for the echo wh-questions:

(41)
```
                *
                *                *
                *                *
{[(Le vendono DOVE)φ]ι   [(le mandorle?)φ]ι}υ
          L + ¡H* H%
```

Moreover, the analysis in (41) can be maintained independently of the syntactic analysis one assumes for the sentence final right dislocated direct object. Either under a clause-external (cf. Frascarelli 2000, 2008; Cardinaletti 2001, 2002) or a

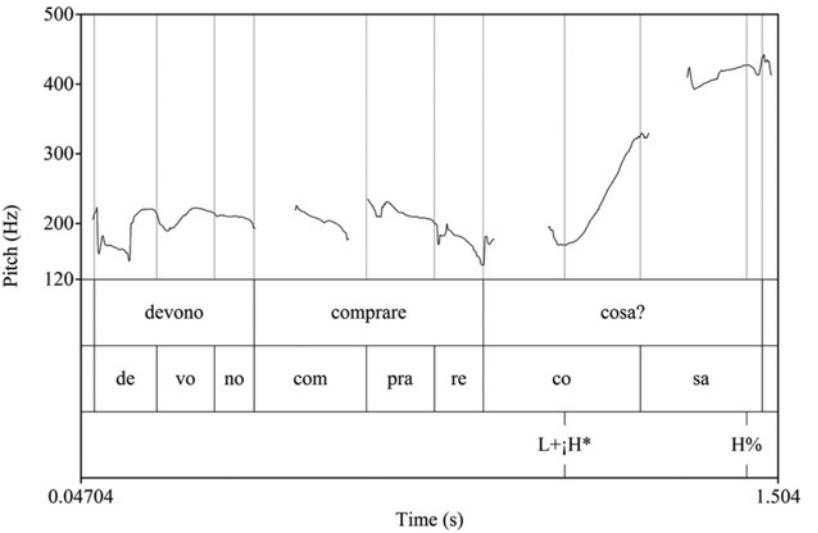


Figure 13: Utterance with branching predicate *Devono comprare COSA?* Female speaker (L).

clause-internal analysis (Cecchetto 1999; Samek-Lodovici 2006) the right-dislocated object[26] is realized in a separated prosodic phrase. We leave the issue concerning the syntactic position appearing at the end of the sentence open for further research.

As for the tonal level, in the first intonational phrase, two tonal targets, L and H, can be identified by visual inspection. The pitch movement of the wh-item can be analyzed as a sequence of a pitch accent and an edge tone. The pitch movement on the wh-word has an expanded pitch range: the mean L – H pitch excursion is 202 Hz (female spks.) and 113 Hz (male spk.). The expanded range appears as a peculiar feature of this tune, similarly to what has been observed in the case of other counter-expectational echo questions in several Italian varieties (Gili-Fivela et al. 2015). The expansion of the range, therefore, could be a phonological feature necessary to make these questions acceptable. However, further research to ascertain the nature and the role of scaling in echo utterances is still needed.

Figure 14 shows the relevant alignment properties of the tonal targets. Both L and H occur on the wh-word. L is aligned on average 28 ms before the onset of the stressed vowel. The whole vowel nucleus is occupied by a rise

26 Notice also that an extensive experimental investigation of the phonetic correlates of the different levels of phrasing in Italian is still needed. Experimental evidence on the phonetics of boundaries can be found e.g. in Frota et al. (2007).

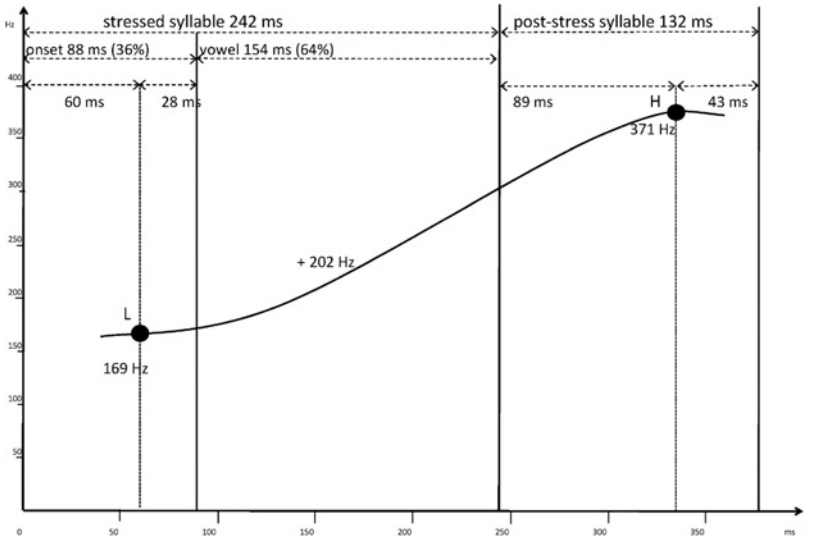


Figure 14: Frequency values and alignment properties of L and H in the focal accent of echo wh-questions. Frequency values are referred to the female speakers.

ending with a visible H aligned to the post-stress syllable, located about 43 ms before the end of the syllable/word. To approximate the slope of the curve, we calculated the frequency/time rate, which is 780 Hz/s in the female speakers and 457 Hz/s in the case of the male speakers. Notice that, because pitch accent and edge tone form a rising movement, we cannot determine if the visible H tone belongs to the accent or to the edge. In any case, perceptually, the pitch movement points to an H target. Based on the acoustic measurement and on the perceptual and visual evaluation, we analyze the tune as L + ¡H* H%. Crucially, this pitch accent is evidently associated to the wh-word, in contrast with what has been observed in regular, information-seeking wh-questions. As mentioned above, echo wh-questions are characterized by an expanded pitch range. Along the lines of Gili-Fivela et al. (2015), we render this feature in the tonal transcription by means of the diacritic ¡, which indicates an upstep rise.

4.1.5 Experiment 1: Conclusions

The results of experiment 1 show that the two pitch accents are substantially different. Firstly, H + L* in information-seeking wh-questions and L + ¡H* in

echo wh-questions have clearly different tonal structure and scaling properties. The two accents differ also as for their phonological association: whereas in echo wh-questions L + ¡H* is associated to the wh-word, in regular information seeking wh-questions, H + L* is associated to the verbal predicate. This result confirms that wh-items such as *dove* 'where' normally cannot bear the main prominence in information-seeking questions. In echo wh-questions, instead, the prosodic focus is narrowed to the wh-word, while the verbal predicate does not bear any accent. This difference suggests that in echo wh-questions, the type of focus involved has different features with respect to the focus of regular information-seeking wh-questions.

The experiment has also shown that echo wh-questions are phrased in two different intonational phrases. This analysis implies that the prosodic head of the utterance is not located on the rightmost element. Bocci's (2013) analysis of *ex situ* contrastive focus in Siena Italian has convincingly shown, on the basis of experimental evidence, that post-focal material is fully phonologically represented on the metrical and tonal level. In echo wh-questions such as those examined in this paper, the focused element (the wh- *dove* 'where') is followed by a second intonational phrase, which is also characterized by strongly dynamic pitch movements (cf. Figures 10–12). In this case, therefore, there is no doubt that the post-focal material is headed and phrased, since the presence of pitch accents and tonal boundaries is paramount (see Crocco and Badan 2016). The data from echo wh-questions, therefore, provide further evidence that post-focal material in Italian is fully phonologically represented.

It is worth pointing out that prosodic form and interpretative features seems inseparable in the examined questions. A specific prosody on the wh-word *in situ* is mandatory to get the echo interpretation. Without such a prosody, sentences (42a) and (42c) would not be acceptable, or at least they would lose their echo reading while becoming infelicitous. Compare (42a) with (42b), and (42c) with (42d):

(42) a. *È arrivato CHI per primo?*
b. *#È arrivato chi per primo?*
be.PRS.3SG arrive-PST.PRT who for first
'Is arrived WHO as first?'
c. *Hai visto COSA ieri?*
d. *#Hai visto cosa ieri?*
have.PRS.2SG see.PST.PRT what yesterday
'You have seen WHAT yesterday?'

4.2 Prosodic experiment 2: echo wh-questions *vs*. corrective focus

We have shown so far that information-seeking and echo wh-questions are clearly distinguished from one another. In experiment 2, we focus on another type of utterance that has point in contacts with echo wh-questions: corrective focus.

Bianchi and Bocci (2012) analyze contrastive focus in affirmative sentences (as in [43]) pointing out a number of properties distinguishing contrastive from corrective focus (as exemplified in [44]). The authors show that the conversation dynamics between the two foci are different. More in detail, Bianchi et al. (2015), and Bianchi and Bocci (2012: 5) characterize a contrastive focus as a focus that "simply conveys that one focus alternative is salient in the context, but it does not associate any particular presupposition to this alternative". On the contrary, corrective focus activates specific presuppositions, whereby speaker B rejects A's assertion and asserts a distinct proposition. The examples analyzed by the authors show that the symmetrically contrasting alternatives are specified in the antecedent clause and in the negative tag.

(43) A: *Maria era molto elegante l' altra sera a teatro*.
Maria be.PRS.3SG very elegant the other evening at theatre
'Maria was really elegant the other evening at the theatre.'
B: *Si era mess-a [un ArMAni], non [uno*
To.her be.PRS.3SG put-PST.PRT a Armani not a
straccetto di H&M].
cheap dress of H&M
'She wore an Armani (dress) not a cheap dress from H&M.'
(Slightly modified from Bianchi and Bocci 2012: 2–4)

Differently, a correction (a corrective focus) is a complex conversational move that involves the denial of a previously asserted proposition and the assertion of a distinct proposition.

(44) A: *L' altra sera a teatro, Maria si era*
the other evening at theatre Maria to.her be.PRS.3SG
messa uno straccetto di H&M.
put-PST.PRT a cheap dress of H&M
'Yesterday evening at the theatre, Maria wore a cheap dress from H&M.'

B: *No, si era messa un ArMAni.*
no to.her be.PRS.3SG put-PST.PRT a Armani
'No, she wore an Armani (dress).'
(Slightly modified from Bianchi and Bocci 2012: 2–3)

Crucially, in order to have the corrective reading, the utterance containing focus must be preceded by the previous context. In fact, the sentence in (43B) can be uttered without a strict and direct reference to the previous context, in the sense that uttered in isolation is still felicitous. Differently, the utterance containing the corrective focus must be uttered with the strict reference to what said before, since the corrective focus express a correction with respect to a specific item in the previous context. Only with this type of reference, in fact, the focus is felicitously interpreted as corrective.

As we have shown in Section 2, on a pair with clauses expressing corrective focus, also echo wh-questions not only express a focus (MirF), but are also strictly and mandatorily linked to the immediately previous context. Recall, in fact, that the echo interpretation of a question is possible only if the question is preceded by the context it refers to (see discussion in Section 2). In this sense, echo wh-questions show similarities with corrective focus utterances, since they express a focalization of an item in the utterance that is interpretable if and only if linked to the previous context. In other words, the presence and the link to the preceding context is a condition *sine qua non* for the emphasis both in MirF focus and corrective focus to be interpretable and felicitous. Moreover, Bianchi et al. (2015) argue that corrective focus can appear either in the left or in the low periphery, whereas the syntactic position of contrastive focus is more constrained. For this reason, we choose to compare MirF with corrective focus, instead of the more constrained contrastive focus.

On this basis, one may argue that focus in echo wh-questions share interpretative and prosodic features with *corrective focus* of declarative utterances. The goal of experiment 2 is the description of the main prosodic features of a corrective focus item in Este Italian. Such an interpretation, however, would require that the corrective focus and echo wh-questions would also share not only pragmatic but also formal features. In any case, the role of prosody seems crucial in both corrective and echo wh-utterances: as seen in the previous section, prosody is necessary to express the echo interpretation. Without a specific prosody, in fact, echo wh-questions *in situ* would be infelicitous. Also in the case of corrective focus *in situ*, prosody is necessary to convey the desired meaning. Therefore, if MirF in echo wh-questions and corrective focus in statements are instances of a unique phenomenon, one could expect that they share basic prosodic features marking them in a

common, recognizable manner. On this basis, we conducted experiment 2 examining declarative utterances expressing corrective focus in sentences with unmarked syntactic structure in the variety under examination. Since obviously the clause type (declarative vs. interrogative) will affect the prosody of the utterances we aim to contrast, we cannot expect that these two types of utterances will be directly comparable. However, we may expect that equal focus will be phonologically encoded e.g. by selecting a pitch accent with analogous phonological and phonetic properties.

4.2.1 Experimental procedure

For this experiment, we recorded the same speakers (A, C, L, S) recorded for experiment 1 following the same methodology described in Section 2.1. From the elicited material, we extracted 45 suitable statements expressing a corrective focus. The target word is a trisyllable with stress on the penult, such as *Torino* 'Turin', *Milano* 'Milan' or *limoni* 'lemons' occurring in sentence-final position. The stressed syllable is CV with a voiced consonant onset. The following are examples of the target sentences:

(45) A: *I Belmonte ora abitano a Venezia*
'The Belmontes now live in Venice.'
B: *No, guarda che vivono a Milano.*
no look-IMP.2SG that live-PRS.3PL at Milan
'No, they live in Milan.'

(46) A: *Vuole delle arance?*
'Would you like some oranges?'
B: *No, vorrei dei limoni.*
no want.COND.1SG some lemon-pl
'No, I would like to have lemons.'

4.2.2 Results

Corrective focus utterances are characterized by the presence of one major pitch movement located at the end of the utterance on the focused word, as in Figure 15. In contrast with echo wh-questions, corrective focus utterances present a certain variability as far as the prosodic realization is concerned. While most of the utterances (42 out of the 45) showed a rising accent of the focused word, a minority of the utterances have a falling prosodic pattern.

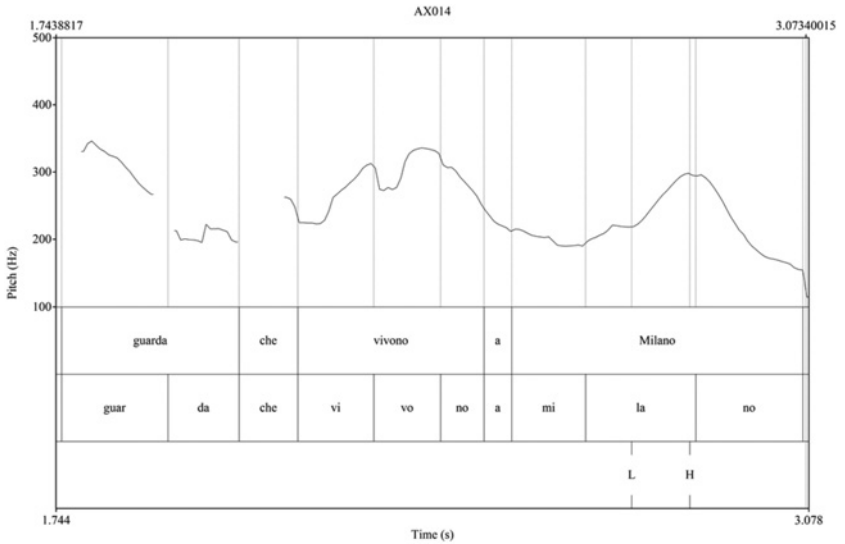


Figure 15: Corrective focus statement *Guarda che vivono a Milano*. Female speaker (A).

The nuclear tune of the corrective focus can be analyzed as a sequence of a rising pitch accent followed by a low boundary tone. While both echo wh-word and corrective focus utterances (with few exceptions) are produced with an accentual rise, the scaling of the two movements is clearly different. In particular, in the case of the statement, the pitch range is not as expanded as in wh-questions. The mean L to H excursion is 78 Hz (female speakers) and 29 Hz (male speaker) vs., respectively, 202 Hz and 113 Hz in echo wh-questions. This difference can be noticed both auditory and visually, and is also confirmed for both male and female speakers by the results of a *t*-test one-sided to the pitch excursion values of the two groups of utterances ($p < 0.005$). The results of the test are summarized in Figure 16.

As in the experiment 1, we calculated the frequency/time rate, which is 668 Hz/s in the female speakers and 221 Hz/s in the case of the male speaker, to approximate the slope of the curve. The results of a t-test show that these values are significantly different from those measured in the echo wh-questions for the male speaker. However, this is not the case for the female speakers. Therefore, evidence on this point is insufficient.

As for the alignment properties, H is aligned to the nucleus (avg. 21 ms before the syllable offset), while L is aligned after the vowel onset (avg. 12 ms), as shown in Figure 17 (cf. also Figure 15). Note that in echo questions the L target of L + ¡H* is aligned before the vowel onset rather than after. The results

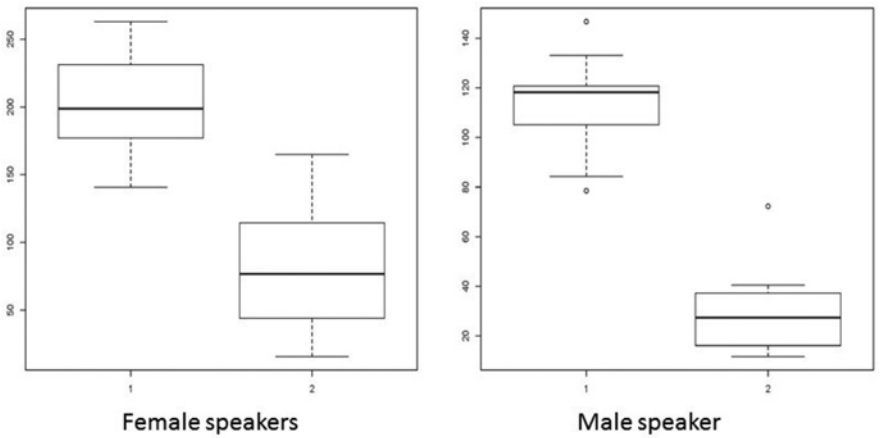


Figure 16: H to L excursion for female and male speakers in echo wh-questions (1) and corrective focus utterances (2).

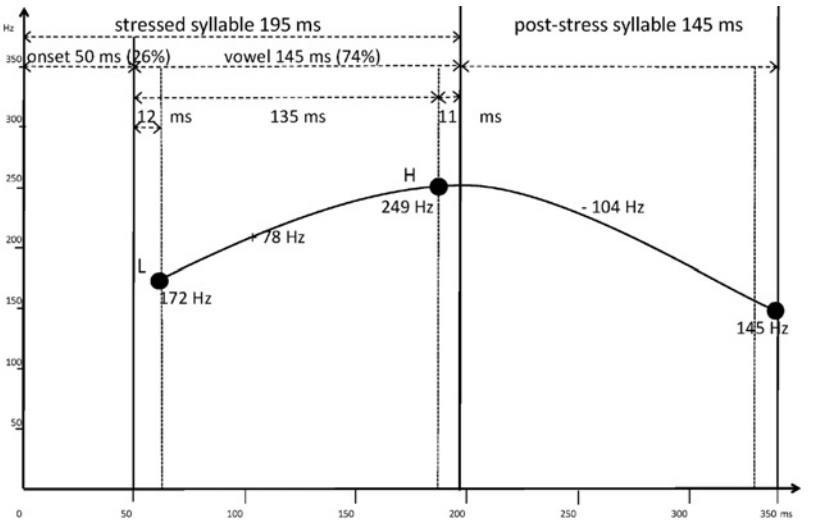


Figure 17: Mean duration of stressed and post-stress syllables and alignment properties of L and H in corrective focus utterances. The mean frequency values of L and H and the mean pitch excursion are referred to female speakers.

of a Wilcoxon rank sum test show that the alignment values of L are significantly different in corrective utterances and in echo wh-questions ($p < 0.005$; see Figure 18). It is worth mentioning that the alignment properties of H are less straightforwardly comparable because the visible H target in echo wh-

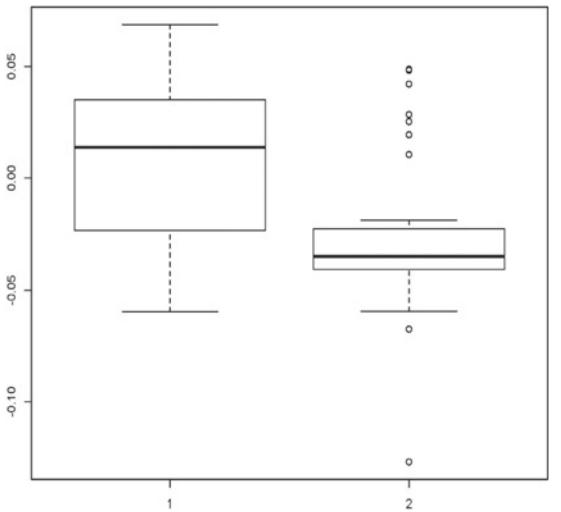


Figure 18: Median latency values of L in corrective focus utterances (1) and echo wh-questions (2) for all speakers.

questions is followed by a similar tone and, therefore, its alignment cannot be precisely determined.

Summing up, based on the perceptual approach previously used for analysis of tonal association in echo wh-questions (Prieto et al. 2005), we propose to analyze the pitch accent expressing corrective focus as a rising L + H*. The complete tune is the following:

(47) L + H* L%.

Crucially, the pitch accent of echo wh-questions and that one of corrective statements are distinguished by different scaling properties which are expressed by the presence of absence of an upstep rise diacritic ¡.[27]

The results of experiment 2 show that echo wh-questions and corrective focus utterances have different phonetic and phonological properties. Firstly, corrective focus can be realized by selecting different pitch accents, although in

27 The proposed analysis of the contrast between the pitch accents of echo wh-questions and corrective focus statements could be refined to express e.g. the alignment differences between the targets. However, for the purposes of the current paper, the scaling contrast seems sufficient to distinguish the two accents. We leave further refinement of the tonal analysis for future research.

our sample different pitch accents only appear in a small minority of cases. An variability in the realization of corrective focus has been previously observed in several other Italian varieties (cf. Gili-Fivela et al. 2015). Our results, therefore, are in line with the preceding studies. In contrast with corrective focus utterances, echo wh-questions are systematically realized with the described prosodic pattern.

A relevant difference between corrective focus and echo wh-questions concerns the prosodic properties of the pitch accent expressing focus. In fact, while both corrective focus and echo wh-questions are characterized by a narrow prosodic focus, the alignment properties of the L targets and the size of the pitch excursion are significantly different in the two accents. The results of this experiment suggest that corrective focus and echo wh- questions can be considered as different phenomena from the prosodic point of view.

Summing up, experiment 1 and 2 indicate that regular wh-questions echo wh-questions and corrective focus statements display different prosodic properties. The results suggest that echo wh-questions can express a specific type of focus, i.e. MirF, different from informational as well as corrective focus.

5 Conclusions

In this article, we proposed an analysis of the so-called echo wh-questions *in situ* in Italian at syntax–prosody interface. We show that the structural properties of echo wh-questions correspond to prosodic properties distinguishing them from other types of focus.

We have conducted the prosodic analysis under an experimental approach, arguing that a focalized wh-word in echo wh-questions shows its own peculiar properties, different from informative and corrective focus, so that we can analyze it as an instance of MirF. In a framework that explores the interplay between prosodic and syntactic properties, the differences of the prosodic characteristics of MirF reflect its syntactic structure. We have demonstrated, in fact, that the wh-word in echo wh-questions is not *in situ*, but it occupies a focus position within the low periphery *à la* Belletti (2001, 2004). Crucially, the focus position within the low periphery activated in an echo wh-question, has different syntactic, prosodic and interpretive properties with respect to the low focus proposed by Belletti for the subject, i.e. an informational focus, and with respect to the corrective focus. Therefore, at a general level, our analysis strengthens the idea advanced by Belletti (2004: 17) that partly different intonations and interpretations are associated to positions within the low periphery as opposed to the positions in the left periphery.

Acknowledgements: We are very grateful to the two anonymous reviewers whose insightful comments and suggestions helped us to improve the paper substantially. We are also grateful to the Journal editor for his encouragement. We wish to thank Adriana Belletti for the inspiring discussions and for her comments on an earlier draft. This paper has been presented at the *Séminaire de Recherche en Linguistique* of the University of Geneva. We thank the audience for the stimulating feedback. Although every part of the paper has been written together, Linda Badan takes responsibility for Sections 1–3 and Claudia Crocco of Sections 4 and 5. All errors are ours.

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